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MACROTHEMIS FALLAX, A NEW SPECIES OF DRAGONFLY FROM CENTRAL AMERICA (ANISOPTERA: LIBELLULIDAE), WITH A KEY TO MALE MACROTHEMIS

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Abstract

Macrothemis fallax spec. nov is described and figured from males collected in Belize and central Panama. It is apparently closely related to the widespread species, *M. pseudimitans* Calvert, 1898, with which it has hitherto been confused. These two species differ in shape of the cerci and epiproct, metafemoral armature, and thoracic and tibial coloration. A key to males of the genus, based largely on literature sources, is also provided.

Introduction

The genus *Macrothemis* is almost exclusively Neotropical, although a few species range northward into northern Mexico and the southwestern United States (Needham & Westfall, 1955). It comprises 39 or 40 species (Bridges, 1994, following Garrison, 1991, placed *M. valida* Navás, 1916, in *Brechmorhoga,* a plausible but so far unsubstantiated transfer), including the one described here. The latter is typical of the genus in that the inferior tooth of each tarsal claw is enlarged and its tip extends beyond that of the superior tooth. Thus the placement in *Macrothemis* rather than *Brechmorhoga* is clearly warranted, although the trigonal interspace of one forewing of the holotype is widened distally more than is usual in *Macrothemis* (Donnelly, 1984).

The last comprehensive treatment of the genus was that of Ris (1913); although still very useful, this work is seriously outdated owing to the subsequent description of 15 species (Belle, 1983, 1987; Costa 1990, 1991; Donnelly, 1984; Gonzalez, 1992; Navás, 1916, 1918; Rácenis, 1957; Ris, 1919; Santos, 1967). Thus, in addition to describing the new species, I present a provisional key to males of *Macrothemis.*

Terminology and methods

Terminology for the caudal appendages follows Snodgrass (1954) and for thoracic morphology and markings Needham, Westfall and May (In press). All measurements are in mm and were made with a ruler (to 0.5 mm), MiniScale™ ruler (to 0.1 mm) or filar

micrometer (to 0.01 mm). Total length and abdomen length include the cerci. I report fractional quantities using the convention of expressing exact measurements as decimals and approximations, including visual estimates, as common fractions. Bilaterally asymmetrical counts and measurements are given as left/right. Illustrations were modified from sketches made using a Wild™ stereo microscope equipped with a camera lucida.

Description

Diagnosis: Closely similar in general appearance to *M. pseudimitans* but males distinguished by the following characters (those of *M. pseudimitans* in parentheses): cerci in dorsal view divergent apically (convergent for entire length); epiproct slender distally, distance between terminal denticles about 0.1 mm (broad distally, this distance about 0.2 mm); subquadrate spines of metafemur small (large and robust); metepisternal pale stripe continuous, or very nearly, so immediately behind spiracle (separated into distinct upper and lower spots, or with lower spot absent); tibiae dark brown, concolorous with femora (tan, paler than external surface of femora). Distinguished from males of all other species by the combination of: inferior tooth of each tarsal claw enlarged; stout teeth on metafemora subquadrate; cerci without a single prominent ventral tooth and not decurved apically; hamules almost smoothly curved throughout most of their length; terminal segments of abdomen broadly expanded; pair of large, pale dorsal spots on abdominal segment 7; antehumeral stripes wedge-shaped; lateral pterothoracic pale markings divided into separate spots, except metepisternal stipe continuous or nearly so. Female unknown.

Material Examined: Holotype - male (#1), Belize, Cayo District, Mountain Pine Ridge Forest Preserve, Chiquibul Rd. at Lil Vaqueros Creek, 1 June 1993, coll. by W. F. Mauffray, collection of W. F. Mauffray (to be deposited in Florida State Collection of Arthropods); paratypes - male (#2), same data as holotype; male (#3), Panama, Canal Zone, forest preserve near Summit, 15 April 1961, coll. by W. H. Cross, Florida State Collection of Arthropods; male (#4), Panama, Prov. Colon, Río Guanche, 13 July 1974, coll. by M.L. May, collection of M. L. May.

Description of Holotype: Specimen preserved dry in Mylar envelope; flagellum of left antenna missing, left protarsus detached in envelope.

Head: Labium brownish yellow. Labrum brownish yellow centrally, becoming brown in lateral 1/4 on each side. Clypeus blue-grey, very narrowly brownish yellow on margins of postclypeus. Antefrons brownish yellow on anterior surface, darker posterolaterally, postfrons dark metallic blue, very narrow brown band separating dark blue and pale areas at upper margin of antefrons. Vertex dark metallic blue dorsally and anteriorly, posterior rim dark brown, antennae black, ocelli amber. Eyes tan with diffuse darker areas (discolored), eye seam 0.7 mm. Entire face and epicranium with numerous black setae, those on labrum with obvious brown basal dots. Occipital triangle 1.1 mm long, convex posteriorly with median sulcus and long brown setae. Rear of head brown except pale greyish yellow along lateral and ventrolateral border of each eye; brown setae along posterodorsal and posterolateral surfaces, longest dorsally.

Thorax: Pronotum largely brown, darker on central pit, anterior lobe yellow-green in middle 1/3 with narrow marginal line of yellow extending outward nearly to corners, small yellow marginal triangles medially and at lateral corners of hind lobe, orange-brown

dorsolateral oval spots on each side of middle lobe; propleuron brown with small orange-brown spots at dorsal margin. Pterothorax with ground color dark brown, somewhat lighter toward ventral margins of pleura and on venter, some of these mottled orange-brown (discolored?). Antehumeral stripes turquoise, wedge-shaped, 2.6 mm long, 1.0 mm wide at upper end, separated posterodorsally by 0.5 mm. Mesopleural suture with moderate sinuosity at midlength. Lateral pale markings blue-green, considerably divided by intervening dark areas but with metepisternal stripe continuous except across extremely narrow brown carina extending backward from spiracle (as in Fig. 1a).

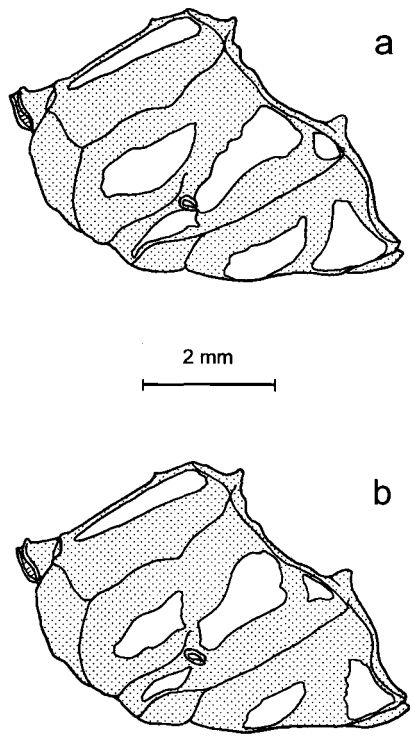

Figure 1: Pterothorax, left lateral view; shading schematic but pattern based on camera lucida drawings. a. *M. fallax*, paratype #3, male. b. *M. pseudimitans*, male (Panama, Area del Canal).

Anteroventral metepimeral pale spot extending faintly and diffusely forward and ventromedially behind third coxae; just behind this, oblique darker bands forming inverted "V" on venter.

Wings: Venation and pterostigmata very dark brown, nearly black, membrane very faintly yellow, color deepest toward base of hindwing. Forewings each with 11-1/2 antenodal crossveins, 8 postnodal crossveins, triangles 1-celled, subtriangles 2-celled, 2 cell rows in trigonal interspace to one cell before level of nodus, ratio of distal to proximal width of trigonal interspace 1.45 in left wing, 1.25 in right wing (=discoidal index of

Donnelly, 1984), nodus at 0.56 wing length (=nodal index), median planate absent, pterostigma 2.1 mm long. Hindwings each with 9 antenodal crossveins, 9 postnodal crossveins, triangle 1-celled, 1 cell row in trigonal interspace for 3 cells, 3 cell rows between posterobasal margin of anal loop and anal margin of wings, nodal index 0.48, pterostigma 2.0 mm long.

Legs: Coxae and trochanters medium brown, darker on anterior surface of trochanters; more distally legs very dark brown, nearly black, except most of flexor surface of each profemur pale. Profemora each with slender spines increasing in length from base to apex, protibiae with usual inner and outer rows of spurs, inner modified as "cleaning comb" in distal 2/5. Mesofemora each with row of small denticles on outer angle, inner angle with numerous long, hairlike spurs arranged roughly in two rows. Metafemora with 12/10 short, distinctly subquadrate spines (as in Fig. 2a) on outer angle of flexor surface; rather sparse, long hairlike spurs on inner surface and shorter ones on extensor surface. Tibial armature consisting of rows of long, hairlike spurs and/or setae. Tarsal claws all with inferior tooth larger than and extending beyond superior tooth.

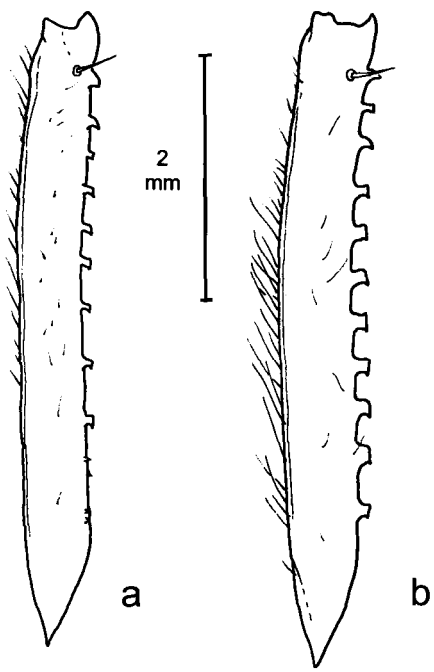

Figure 2: Metafemur, left lateral view, showing form of subquadrate spines. a. *M. fallax* paratype #4, male. b. *M. pseudimitans*, male (Panama, Area del Canal).

Abdomen: Ground color dark brown, slightly paler laterally on segments 1-3 and on extreme ventromedial margins of terga; pale markings blue-green, some shading peripherally to yellow, all bilateral. Segment 1 with minute ventrolateral submarginal spot. Segment 2 with dorsolateral spot, narrow anterior to supplementary transverse carina, widened and displaced somewhat laterad posterior to carina; oblong lateral apical spot

with notch in anteroventral corner; oblong ventrolateral area just above secondary genitalia. The latter (Fig. 3) mostly brown, pale on posterior surface of hamule.

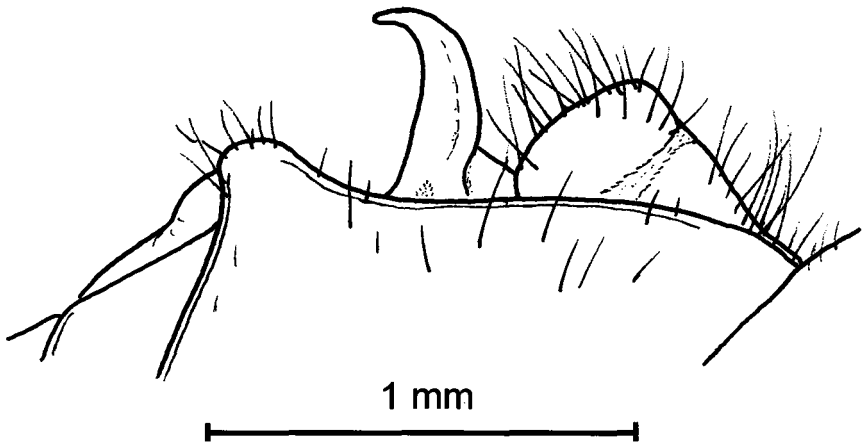

Figure 3: Secondary genitalia, left lateral view, *M. fallax*, paratype #3, male.

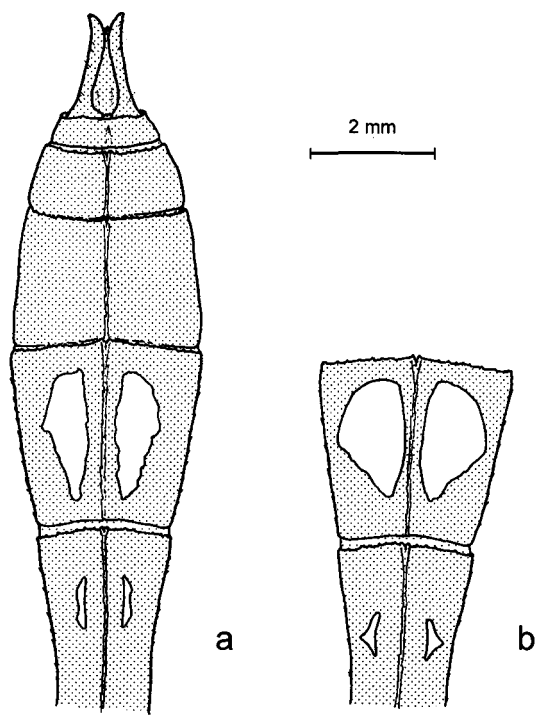

Figure 4: Terminal segments of abdomen, dorsal view; shading schematic but pattern based on camera lucida drawings. a. *M. fallax*, paratype #4, male (segments 6-10; drawn slightly broader than in direct dorsal view of specimen to facilitate comparison with 4b and to correct for slight postmortem compression). b. *M. pseudimitans*, male (Panama, Area del Canal; segments 6-7 only).

Segment 3 with dorsolateral streak about 4/5 length of segment, interrupted at supplementary transverse carina; lateral basal spot, slightly tapered posteriorly; ventromedial stripe almost full length and tapered posteriorly in posterior 3/4. Segment 4 with similar but narrower dorsolateral stripe about 3/4 length; very small, diffuse lateral basal spot; narrow midventral line. Segments 5 and 6 with extremely thin dorsolateral streaks (1/3 and 1/5 segment lengths, respectively) and minute dorsolateral basal spots (barely visible on segment 6). Segment 7 with broad, elongate dorsolateral spot (similar to Fig. 4a, with lateral projection slightly more exaggerated), about 2.5 mm long by 1.0 mm wide. Segments 8-10 and caudal appendages without pale markings except small, indistinct transverse brown mark at midlength of segment 8. Supplementary transverse carinae well developed on segments 2-4, at 1/3, 2/5, and 1/4 segment lengths, respectively, barely detectable near base of segments 5 and 6, absent from remaining segments. Lateral carinae well developed on segments 3-9. Abdomen broadly expanded laterally at distal end of segment 6 and on segments 7-9, minimum width (at base of segment 4) 1.2 mm, maximum width (at middle of segment 7) 2.2 mm, somewhat laterally compressed postmortem beyond latter point. Caudal appendages as in Fig. 5a-c; cerci 1.97 mm long, in dorsal view slightly but distinctly divergent apically, in lateral view each swollen to maximum width at just beyond 2/3 length, with 10/6 ventral denticles at and just anterior to widest point; epiproct tapered, slender in distal 1/2, apex very narrowly truncate, 1.62 mm long, distance between apical denticles about 0.10 mm (less than 1/8 basal width).

Dimensions: total length - 39.5; abdomen - 28.0; forewing - 31.5; hindwing - 30.0.

Paratypes: All slightly smaller than holotype, the second Belize specimen the smallest. Paratype #3 generally slightly paler than others, probably because less mature, markings of propleura and middle pronotal lobe hardly indicated, lateral pterothoracic markings greenish yellow, pale abdominal markings olive yellow. Paratype #4 with metepisternal pale stripe narrowed but continuous across postspiracular carina. Both Panamanian specimens with more extensive yellowish areas on clypeus than in Belizan specimens. None of paratypes with brown marking on abdominal segment 8. Venation, forewings: antenodal crossveins [11-1/2][13-1/2], postnodal crossveins 7-10, triangle 1-celled, subtriangle 2-celled except 3-celled on left side in #2, nodal index 0.53-0.55, discoidal index 1.11-1.26; hindwings: antenodal crossveins 8-9, postnodal crossveins 9-10, triangle 1-celled, 1 cell row in trigonal interspace for 2-3 cells, nodal index 0.46-0.47. Subquadrate metafemoral spines 8-10, those of right side of #3 somewhat triangular. Maximum width of abdominal segment 7 2.1-2.5 mm (all subject to slight to moderate lateral compression); cerci with 6-8 small ventral denticles. Dimensions: total length 35.0-38.0; abdomen 25.0-26.5; forewing 28.5-29.0; hindwing 27.5-28.5; cerci 1.8-1.9.

Discussion

The similarity of *M. fallax* (the Latin adjective, "*fallax*", means deceptive) to *M. pseudimitans* led at least three knowledgeable odonatologists (here to remain nameless) to misidentify the specimens of the type series, a circumstance that suggested the name. The two species are essentially identical in size, both have the terminal abdominal segments strikingly widened (perhaps very slightly more so in *M. pseudimitans*) and with a large pale dorsal spot on segment 7, nearly identical hamules, and very similar thoracic

color patterns (Fig. 3) and cerci (Fig. 5); in the latter two characters, however, subtle differences exist, as described above and in the figures. Besides differences described in the Diagnosis above, possible distinctions include the broader, more rounded shape and more distal position of the pale spots on abdominal segment 7 (Fig. 4b) and a stronger upward curvature of the distal 1/2 of the cerci in *M . pseudimitans*.

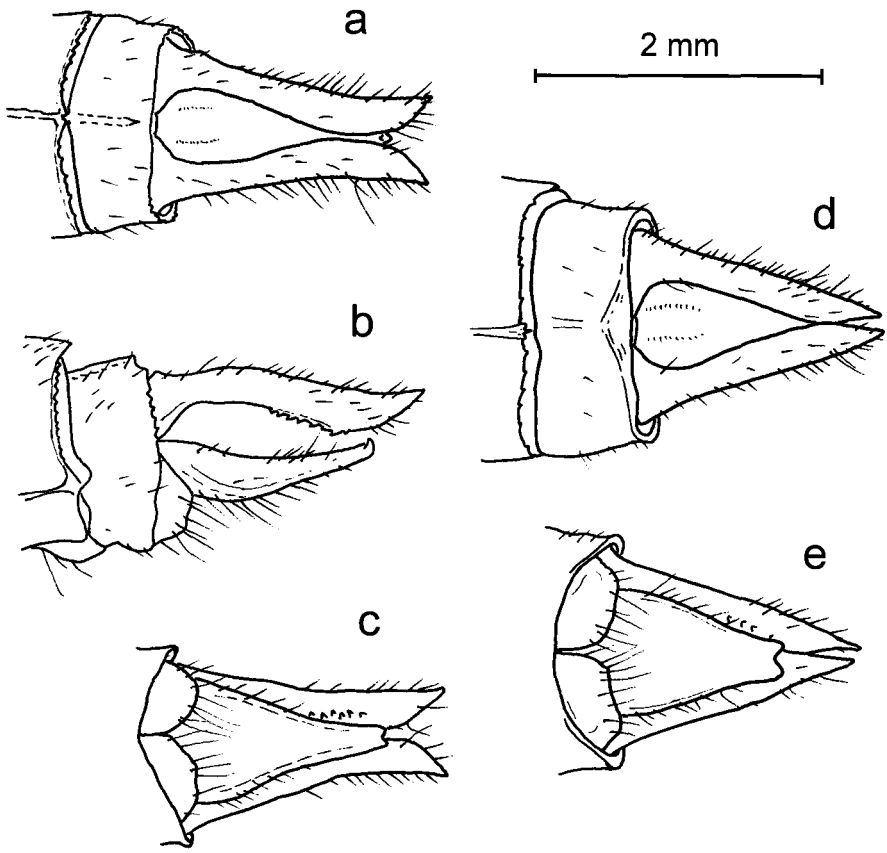

Figure 5: Caudal appendages. a-c. *M. fallax*, paratype #4, male, dorsal view (a), left lateral view (b), ventral view (c). d-e. *M. pseudimitans*, male (Panama, Area del Canal), dorsal view (d), ventral view (e).

Among other species occurring in Central America, *M. fallax* is most likely to be confused with *M. hemichlora* (Burmeister, 1839), *M. imitans* Karsch, 1890, or *M. nobilis* Rácenis, 1957, owing to the enlarged inferior tooth of the tarsal claw and expanded terminal abdominal segments, but all of these species have more extensive pale areas on the sides of the thorax and distinctively different cerci.

Little is known of the habitat or ecological relationships of the new species. Lil Vaqueros Creek, Belize (holotype, paratype #2) is located at approximately 500 m elevation in open, second-growth pine forest in slightly rolling countryside; extensive areas of bedrock were exposed in and alongside the creek bed; other Odonata taken were

Heteragrion alienum Williamson, *Argia gaumeri* Calvert, *A. translata* Hagen, *A. ulmeca* Calvert, *Nehalennia minuta* (Sélys), *Brechmorhoga praecox* (Hagen), *Erythrodiplax fusca* (Rambur), *E. umbrata* (L.), and *Tramea binotata* (Rambur) (W. F. Mauffray, pers. comm., 1998). Paratype #4 was taken while flying in typical *Macrothemis* fashion along the bank of the Río Guanche, a moderately large, rocky stream with a moderate gradient, at an elevation of less than 200 m, only a few km from the Caribbean coast and about 10 km south of the town of Portobello. The day was cloudy and comparatively cool, and the only other anisopteran taken was a male *Neocordulia batesi* (Sélys) hanging up in a streamside shrub.

Key to adult male Macrothemis

The following key includes all species for which males are known (*M. idalia* Ris, 1919, was described from a single female and is thus omitted from the key). I include all the species listed as *Macrothemis* by Bridges (1994), although Costa & Santos (1991) transferred several of these species to *Gynothemis,* based on males having triangular metafemoral spines and on characters of the frons and penis. This transfer may well be justified, as the relationship of the two genera is close, and it seems quite likely that some rearrangement of these genera is needed. Because the changes so far have been proposed only in an abstract without illustrative details, however, and because I did not have sufficient material to evaluate the authors' conclusions, I have taken a conservative approach and retained the questionable species in *Macrothemis.*

Most of the data is from the literature, although I examined specimens at the FSCA and in my own collection. In nearly all cases I referred to original descriptions and in addition had Ris' (1913) excellent key and illustrations as a starting point; other important sources were Calvert (1898, 1906, 1909) and Costa (1990). Nevertheless, this key must be regarded as a very preliminary analysis. Intraspecific variability, especially age-dependent color change (e.g., development of pruinosity), is only very imperfectly taken into account. Furthermore, a number of additional undescribed species undoubtedly exist, so the likelihood of encountering species that do not fit the key is relatively high. I present it largely in the hope that, by summarizing previous work, it will highlight gaps in our knowledge of the genus and so make them easier to fill in the future.

1. Tarsal claws each with inferior (proximal) tooth distinctly smaller than superior (distal) tooth, at least on pro- and mesotarsi 2

1'. Tarsal claws each with inferior tooth as large as or larger than superior tooth on all tarsi 8

2(1). Metatarsi each with inferior tooth larger than superior tooth on outer (anterior) claw, smaller than superior tooth on inner (posterior) claw; antehumeral pale stripe confined to medial 1/2 of mesepisternum except at extreme upper end, mesepimeral pale stripe confined to posteroventral 1/2 of mesepimeron, thus leaving very wide humeral dark area; cerci each blunt at apex ..... *absimile*

2'. Metatarsi each with inferior tooth smaller than superior tooth on both claws;

antehumeral pale stripe variable, mesepimeral pale stripe extending onto ante rior 1/2 of mesepimeron, thus humeral dark area not unusually wide; cerci each acute at apex.....3

3(2'). Cerci in lateral view each with prominent ventral tooth, tooth itself often denticulate.....4

3'. Cerci in lateral view each with pronounced ventral angle, usually denticulate, but without distinct, prominent tooth.....7

4(3). Cerci each with small, subbasal ventral tooth in addition to very prominent ventral tooth at 1/2-2/3 length; metafemora each with stout, subquadrate teeth confined to distal 1/2-3/5; abdomen about 4/5 length of hindwing.... *newtoni*

4'. Cerci without subbasal ventral teeth; metafemora each with stout, subquadrate teeth usually extending along about distal 3/4 or more; abdomen distinctly more than 4/5 length of hindwing;.....5

5(4'). Hindwings each with 2 cubito-anal crossveins; cerci each with ventral tooth at about 7/10 its length; mesepimeral and metepisternal pale stripes confluent dorsally, forming inverted U-shaped marking..... *ultima*

5'. Hindwings each with 1 cubito-anal crossvein; cerci each with ventral tooth at 6/10 its length or less; mesepimeral and metepisternal pale stripes usually not confluent dorsally, thus not forming U-shaped marking;.....6

6(5'). Cerci each with ventral tooth distal to 1/2 its length, in lateral view its width immediately beyond tooth distinctly less than twice minimum width basal to tooth, not unusually long and slender distally; epiproct about 3/4 length of cerci; abdominal segment 7 with prominent, round dorsal spots; abdomen usually at least 23 mm long..... *tessellata*[1]

6'. Cerci each with ventral tooth at or proximal to 1/2 its length, in lateral view its width immediately beyond tooth distinctly more than twice minimum width basal to tooth, very long and slender distally; epiproct about 2/3 length of cerci; abdominal segment 7 without prominent, round dorsal spots; abdomen usually shorter than 22 mm..... *brevidens*

7(3'). Abdominal segment 7 with large, undivided, orange spot covering about 3/4 of dorsum of segment; cerci in lateral view each with apices hardly upcurved; hindwing 28-31 mm long..... *aurimaculata*

7'. Abdominal segment 7 without large, undivided, orange dorsal spot, dorsal spots probably absent; cerci in lateral view with apices markedly upcurved; hindwing

[1]Although usually treated as a subspecies (Bridges, 1994), the taxon *M. inequiunguis* has sometimes been regarded as specifically distinct from *M. tessellata* (e.g., Costa, 1990); the former is distinctly smaller on average, but other differences have not been convincingly described, and examination of a single male from Brazil, identified as *M. t. tessellata* by N.D. dos Santos, shows it to be extremely similar to Central America forms except in size (minor differences in shapes of cerci and hamules need more study), so these forms are left as a single species here.

longer than 32 mm ..... *valida*[2]

8(1'). Metafemora each with row of about 15-25 very small teeth on flexor surface, triangular in outline with tips directed distally, followed by 3-5 much longer, slender spurs; abdomen and hindwings shorter than 20 mm; abdomen nearly cylindrical, hardly expanded on distal segments ..... *pumila*

8'. Metafemora each with row of larger teeth on flexor surface, at least some of these either curved or subquadrate in outline and with tips directed proximally, usually followed by 0-2 longer, slender spurs; abdomen and hindwings usually longer than 20 mm (except *M. belliata*); shape of abdomen variable 9

9(8'). Metafemora each with row of more than 30 teeth on flexor surface, at least some distinctly subquadrate; abdomen, and often hindwings, shorter than 20 mm; antehumeral pale stripe lacking; cerci in lateral view each with ventral angulation at 4/5 length or more; hamules in lateral view each stout in proximal 1/2, very slender and curved through nearly 180° in distal 1/2 ..... *belliata*

9'. Metafemora each with row of no more than 20 triangular or subquadrate teeth on flexor surface; abdomen and hindwings almost always longer than 20 mm; antehumeral pale stripe usually present (except *M. proterva*; may be obscured by pruinosity in *M. rupicola* and *M. polyneura*); cerci and hamules variable but usually not both as above 10

10(9'). Metafemora each distinctly curved, flexor surface with row of subquadrate teeth on distal 1/2, each tooth with proximal corner bent proximally, parallel to long axis of femur, another row (not exactly aligned with distal row) of about 5-9 stout conical teeth or spines, not directed proximally, on proximal 1/3-1/2; apices of cerci bent distinctly downward and outward 11

10'. Metafemora each usually nearly straight, teeth of flexor surface all either curved proximally or subquadrate with proximal corner bent proximally, except sometimes for 1-2 longer, slender apical spurs (not usually exactly in line with row of teeth); apices of cerci not bent distinctly downward and outward 12

11(10). Cerci each with short but distinct ventrobasal, cylindrical process ..... *nobilis*

11'. Cerci each without ventrobasal process ..... *declivata*

12(10'). Pale antehumeral stripes lacking, mesepisterna largely brown, black along each mesopleural suture and on each side of pale median carina; mesepimeron with broad pale stripe nearly full length, metepisternum with large posterodorsal pale spot, metepimeron without distinct pale markings; abdomen cylindrical, dark brown to black without distinct pale markings; metafemora each with short, stout teeth of flexor surface mostly curved proximally almost from their base, yet with proximal ones slightly subquadrate ..... *proterva*

[2]Placed in *Brechmorhoga* by Bridges (1994); see Introduction.

12'. Pale antehumeral stripes present (may be obscured by pruinosity in *M. rupicola* and *M. polyneura*); lateral pale markings not as above, almost always with pale stripe or spots on metepimeron; abdomen variable in shape, almost always with distinct pale markings, at least on basal segments, or largely pale with black markings; metafemoral teeth variable 13

13(12'). Flexor surface of each metafemur with row of short, stout teeth that are subtriangular or curved proximally almost from their base, not subquadrate, distal margin of each tooth oblique to long axis of femur; abdomen nearly cylindrical, not markedly expanded on distal segments 14

13'. Flexor surface of each metafemur with row of short, stout teeth, most of which are subquadrate with distal margin of each parallel to long axis of femur and proximal corner bent proximally; abdomen variable 21

14(13). Hindwings with 2 cubito-anal crossveins 15

14'. Hindwings with 1 cubito-anal crossvein 16

15(14). Postfrons greenish with narrow dark basal line, vertex greenish, not metallic; hamules in lateral view each smoothly attenuate in distal 3/4, curved gradually through much less than 90° ..... *tenuis*

15'. Postfrons and vertex dark metallic blue; hamules in lateral view each stout in proximal 1/3-1/2, very slender and curved through distinctly more than 90° in distal 1/2 ..... *marmorata*

16(15'). Genital lobes each erect, very long and narrow, more prominent than anterior lamina and extending much more than 1/2 length of hamules; hamules each slender and nearly straight in distal 2/3, except for small terminal hook.... *hosanai*

16'. Genital lobes not unusually long and narrow, less prominent than anterior lamina and extending less than 1/2 length of hamules; hamules variable but usually not straight distally 17

17(16'). Cerci bluntly pointed apically; abdomen mostly olive brown with black markings; hamules each stout and with posterior margin straight in basal 1/2-2/3, slender and curved through a little more than 90° distally ..... *rochai*

17'. Cerci distinctly acute apically; abdomen mostly dark with pale markings; hamules variable 18

18(17'). Abdominal segment 7 with large dorsolateral spots or streaks, more than 1/2 length and width of segment on each side and much larger than on segments 4-6; vertex pale brown, postfrons brown with slight metallic sheen; cerci in lateral view with ventral angulation weakly developed, not particularly slender in apical 1/2 ..... *hahneli*

18'. Abdominal segment 7 without pale markings or with these much smaller than above, if more than 1/2 length of segment then narrow and not much larger than those on segments 4-6; vertex dark, postfrons variable; cerci in lateral view with distinct ventral tooth or angulation, otherwise variable 19

19(18'). Postfrons with pair of large greenish spots; cerci in lateral view each with ventral angulation at or before 1/2 length, distal 1/2 of cercus quite slender; hamules in lateral view each straight at base, strongly curved distally ..... *capitata*

19'. Postfrons almost entirely shining black to dark metallic blue; cerci in lateral view each with ventral angulation distinctly beyond 1/2 length, distal 1/2 of cercus not particularly slender; hamules in lateral view not as above 20

20(19'). Cerci in lateral view each with small but distinct ventral tooth; abdominal segments 4-7 entirely dark except minute basal pale spot on each side of segment 4; hamules in lateral view each weakly curved in distal 1/2 ..... *ludia*

20'. Cerci in lateral view each with ventral angulation but no distinct ventral tooth; abdominal segments 4-6 or 7 each usually with small but distinct pale streak on each side at midlength; hamules in lateral view each strongly and uniformly curved throughout distal 3/4 ..... *musiva*

21(13'). Abdomen slender and usually nearly cylindrical, segments 6-9 not markedly expanded (slightly expanded in *M. extensa*); abdomen usually at least as long as hindwings, sometimes considerably longer (slightly shorter in *M. griseofrons* and *M. guarauno*) 22

21'. Abdomen with segments 6-9 distinctly expanded laterally, usually somewhat depressed; abdomen usually shorter than hindwings (slightly longer in *M. cynthia*) 28

22(21). Forewing triangles 2-celled, subtriangles 3-celled; frons and vertex grey or pale blue (may fade to tan); abdomen largely ochraceous with narrowly black carinae, segments 4-6 becoming mostly pruinose blue; cerci each acute apically ..... *griseofrons*

22'. Forewing triangles 1-celled, subtriangles usually 2-celled; frons and vertex not pale blue, usually mostly dark; abdomen usually mostly dark with pale markings or, if not, segments 4-6 not pruinose blue and cerci each blunt apically 23

23(22'). Abdomen mostly cream to olive brown with dark markings on segments 1-3, segments 4-8 largely pale or at least with extensive pale stripes bordering lateral and median carinae; cerci blunt apically 24

23'. Abdomen mostly dark with pale markings, segments 4-8 without extensive pale stripes bordering lateral and median carinae; cerci distinctly acute apically. . 25

24(23). Abdomen shorter than 38 mm, about as long as hindwing ..... *inacuta*

24'. Abdomen longer than 40 mm, distinctly longer than hindwing .. *lauriana, lutea* [3]

25(23'). Hindwings not more than 3/4 length of abdomen; mesepimeron, metepisternum, and metepimeron each with nearly straight green or yellow stripe (metepisternal stripe partly divided by dark spiracle), these separated by straight dark interpleural and metapleural stripes; hamules each nearly straight and smoothly tapered except sharply bent at tip ..... *extensa*

25' Hindwings nearly as long as abdomen (slightly longer in *M. guarauno*); lateral thoracic markings consisting of widely separated pale spots; hamules each more or less smoothly curved throughout their length (unknown for *M. pleurosticta*) 26

26(25'). Antehumeral stripes smoothly tapered anteroventrally; pale stripe on mesepimeron extending most of length of sclerite; cerci in lateral view each with two small but distinct ventral teeth at about 3/4 length ..... *guarauno*

26'. Antehumeral pale stripes each shaped like inverted "L", with straight lateral branch extending anteroventrally, short dorsal branch extending medially; pale marking of mesepimeron confined to anteroventral 1/2 of sclerite; cerci in lateral view each with one ventral tooth, sometimes indistinct 27

27(26'). Labrum pale; venter of metathorax without pale spot behind metacoxae..... *pleurosticta*

27'. Labrum largely dark; venter of metathorax with pale spot behind metacoxae ..... *celeno*

28(21'). Hindwing with 4-5 cell rows between posterobasal margin of anal loop and anal margin of wings; trigonal interspace of hindwing with 2 cell rows immediately adjacent to triangle or separated from triangle by a single cell at most; thorax with moderate blue-grey pruinosity, often obscuring underlying lateral pattern of complete pale stripes on mesepimeron and metepisternum and two narrowly separated spots on metepimeron; abdominal segment 7 with prominent pale dorsal streaks ..... *polyneura*

28'. Hindwing with 3 cell rows between posterobasal margin of anal loop and anal margin of wings; trigonal interspace of hindwing with 1 cell row for 2-4 cells adjacent to triangle, thereafter with 2 or more cell rows; thorax usually without blue-grey pruinosity or, if pruinose, lateral pale markings completely obscured or consisting of 4-5 widely separated pale spots and abdominal segment 7 with pale dorsal markings minute or broadly avoid 29

[3]Based on their descriptions and on tentatively identified specimens I have not been able to be separate these species satisfactorily. *M. lauriana* apparently is generally darker, but this may well be an effect of maturity alone. If future comparison of the types should show them to be synonyms, the name *lutea* would have priority.

29(28'). Thorax almost entirely covered with blue-grey pruinosity, lateral pale markings obscured or, if visible, consisting of 4 widely separated pale spots; abdomen with pale markings on segments 4-6 reduced to very thin lines,often obscured by pruinosity, pale dorsal spots on segment 7 minute ..... *rupicola*

29'. Thorax usually not covered with blue-grey pruinosity, thoracic pattern clearly defined; abdomen with pale markings variable but pale dorsal spots on segment 7 usually not minute 30

30(29'). Cerci in lateral view each with very prominent ventral tooth just beyond 1/2 length, without additional ventral denticles, apices narrow but blunt, in dorsal view nearly straight and parallel or with apices very slightly divergent ..... *imitans*, 31

30'. Cerci in lateral view each without very prominent ventral tooth near 1/2 length, either with small subapical tooth or terminal expansion, or rounded to moderately angulate ventrally with several ventral denticles and with apices acute, in dorsal view usually not as above 32

31(30). Mesepimeral pale markings consisting of 2 widely separated spots .... *i.imitans*[4]

31'. Mesepimeral pale markings consisting of a single broad stripe .... *i. leucozona*[4]

32(30'). Cerci each with subterminal tooth or apical expansion, in lateral view widest point nearly at apex, without ventral denticles 33

32'. Cerci each without subterminal tooth or apical expansion, in lateral view widest at 1/2-3/4 length, with series of 4 or more small ventral denticles at or preceding widest point 34

33(32). Cerci in lateral view each with distinct subterminal tooth, in dorsal view slender and nearly straight and parallel; anterior lamina hardly more prominent than genital lobe; abdomen about 0.85 length of hindwing ..... *flavescens*

33'. Cerci in lateral view without subterminal teeth but each with small, button-like terminal expansion, in dorsal view slightly sinuate, broad at base, tapered to about 2/3 length, then slightly expanded; anterior lamina much more prominent than genital lobe; abdomen more than 0.9 length of hindwing ..... *delia*

34(32'). Metafemora each with subquadrate teeth of flexor surface large and robust; tibiae tan to medium brown, distinctly paler than external surface of femora; epiproct roughly triangular but relatively broad, without subterminal dorsal spines; lateral pale markings of pterothorax consisting of 4-5 widely separated spots ..... *pseudimitans*

34'. Metafemora each with subquadrate teeth of flexor surface relatively small;

[4]Donnely (pers. comm., 1998) has examined specimens of both taxa from Ris' collection and considers them to represent separate species rather than subspecies as originally described.

tibiae dark brown or black, concolorous with external surface of femora; epiproct usually either triangular but relatively narrow or bifurcated apically or with subterminal dorsal spines; thoracic markings variable. 35

35(34'). Epiproct with pair of long, sharply pointed, subterminal dorsal spines in addition to usual apical denticles; cerci each with moderate ventral angle, preceded by several small denticles; lateral pale markings of pterothorax consisting of 5 widely separated spots. . . . . *mortoni*

35'. Epiproct without subterminal dorsal spines; cerci variable; pterothoracic markings variable but usually at least metepisternum with continuous or nearly continuous stripe 36

36(35'). Mesepimeral pale area extending about 2/3 length of sclerite, metepisternal pale stripe constricted or very narrowly divided just behind spiracle, metepimeral pale spots widely separated; terminal abdominal segments broadly expanded laterally; abdominal segment 7 with large pale dorsolateral spot on each side; cerci in lateral view each with low but distinct ventral angulation preceded by 6-10 small denticles; hamules each curved throughout their length, sometimes slightly less strongly so near midlength. . . . . *fallax*

36'. Mesepimeral pale stripe extending nearly full length of sclerite, metepisternal pale stripe broadly continuous behind spiracle, metepimeral pale spots narrowly separated or partly confluent; terminal abdominal segments moderately expanded laterally; pale spots of abdominal segment 7, cerci and hamules variable. 37

37(36'). Cerci each rounded ventrally, without distinct ventral angulation, curved markedly upward and outward just beyond 1/2 length, bend preceded by several relatively coarse, sharp denticles; hamules each strongly curved throughout length; abdominal segment 7 with moderately large, roughly oval or rhomboid pale dorsolateral spot on each side. . . . . *hemichlora*

37'. Cerci each with blunt but distinct ventral angulation preceded by several small blunt denticles, apices not bent strongly upward and outward; hamules each slender and straight for most of length, sharply bent at tip; abdominal segment 7 with small, very narrow pale dorsolateral streak on each side. . . . . *cynthia*

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